Satellite

Q1. Is it possible to carry the ATV signal and an NTSC signal on the same transponder? If so, at what bandwidth? What other multiples are possible with your system?

NHK

1. Required quality level determines the bandwidth needed for simultaneous transmission of ATV and NTSC signals. When the signal formats described in answer to Common Carrier Question 1 are used for satellite transmission, the bit rates and bandwidths for QPSK operation are as shown in the following table:

ATV	NTSC	Total bit rate	Bandwidth
40 Mb/s	17 Mb/s	57 Mb/s	34 MHz
60 Mb/s	17 Mb/s	77 Mb/s	46 Mb/s
120 Mb/s	34 Mb/s	144 Mb/s	92 Mb/s

8ϕ PSK can also be used.

2. Narrow MUSE can also be transmitted using conventional FM modulation. In such a case, 45 MHz is required to transmit both N-MUSE and NTSC as described in the answer to Question 5 in the Broadcast section above.

GI

1. It is possible. One HDTV and two NTSC signals can be carried within 24 MHz using QPSK.

Zenith/ATT

1. See Broadcast section, Question 6.

ATRC

1. Analog satellite links can use an FDM arrangement of AD-HDTV on a QPSK carrier, occupying 6 MHz at baseband, with NTSC on an FM carrier. FDM could be performed at either RF or IF. This could be accomplished using standard transponders, with a lower modulation index for NTSC. This would lower the CNR threshold for NTSC.

2. With digital satellite links providing about 60 Mb/s, a TDM mix of AD-HDTV and/or compressed digital NTSC can be carried. Three AD-HDTV channels can also be carried in a single transponder. C-band (K-band) satellites can deliver 60 Mb/s using a 36 MHz (54 MHz) transponder with QPSK modulation.

MIT

1. Transponder bandwidths are typically between 36 and 72 MHz. FDM can be used to carry both ATV and NTSC signals. TDM can also be used to carry ATV and digital NTSC signals. The CCDC HDTV signal would require 12 MHz bandwidth using QPSK modulation (8PSK trellis coded). A single transponder can easily carry several CCDC-HDTV signals.

Q2. See questions 3 & 7 under Broadcast above.

NHK

1. See the answers to 3 and 7 under Broadcast.

GI

1. See the answers to 3 and 7 under Broadcast.

Zenith/ATT

1. See the answers to 3 and 7 under Broadcast.

ATRC

1. See the answers to 3 and 7 under Broadcast.

MIT

1. See the answers to 3 and 7 under Broadcast.

IS/WP2-0226
21 JUL 92

Report to Implementation Subcommittee

from Working Party 2 on Transition Scenarios

June 29, 1992

1. Analysis of System-Specific Implementation
2. Survey of Professional Equipment Manufacturers
3. Survey of Consumer Electronics Manufacturers
4. Survey of Software Users and Providers
5. Examination of Distributed Transmission Concept
6. Follow-up with Local Area Groups
7. Responsibilities of Selected Proponent
8. Concern for Time Required for Documentation Process
9. Final IS/WP-2 Activities

Analysis of System-Specific Implementation

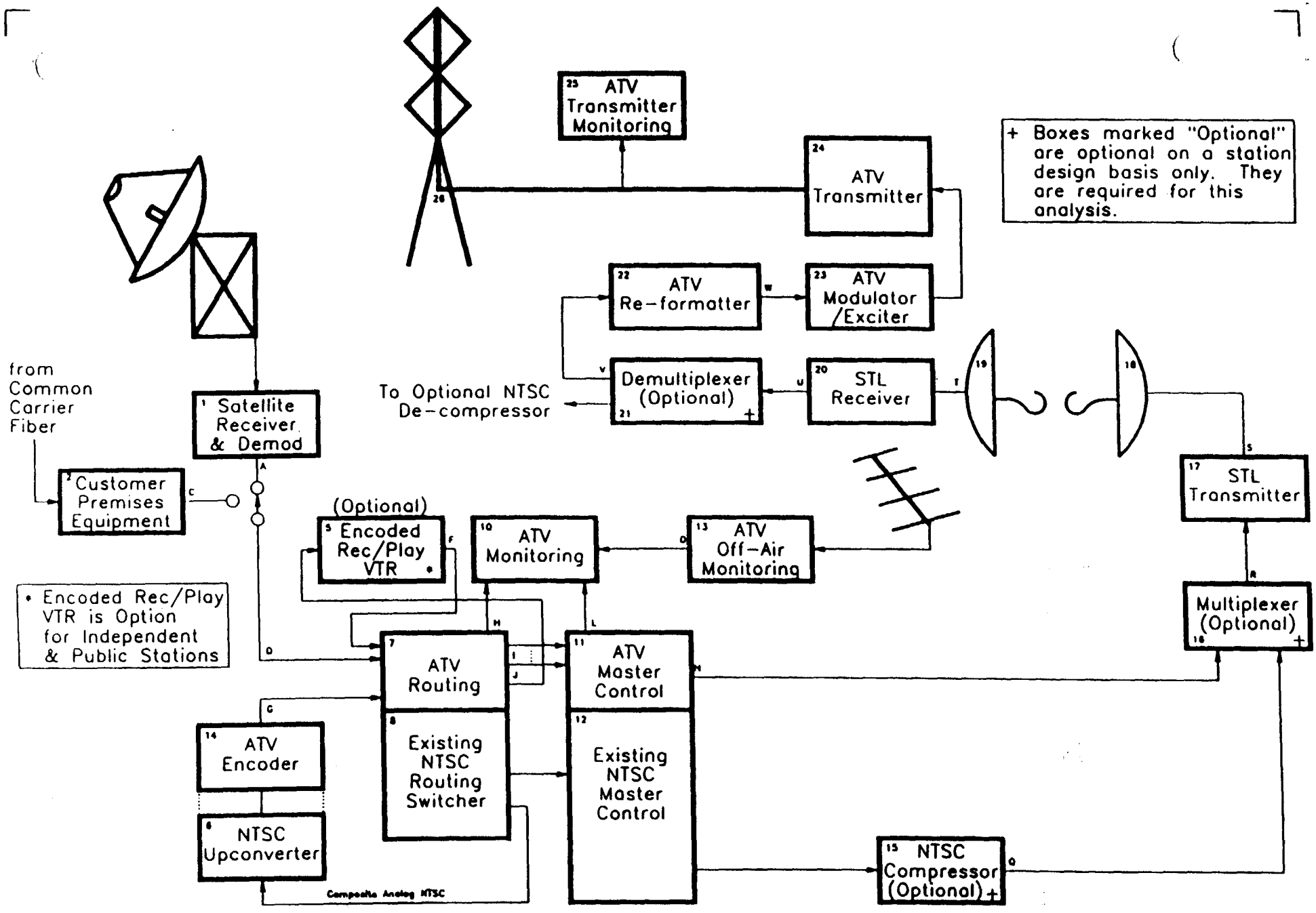
- Proponent meetings – 1/13/92 & 3/25/92
- Questions for Proponents
  - Analysis of initial answers during multiple conference calls
- Follow-up Questions for Proponents
  - Requested for meeting of 3/25/92
  - Last written responses received for meeting of 6/24/92
- Summary tabulation of initial responses prepared
  - Next step is inclusion of follow-up responses in tabulation

Analysis of System-Specific Implementation - *cont'd.(1)*

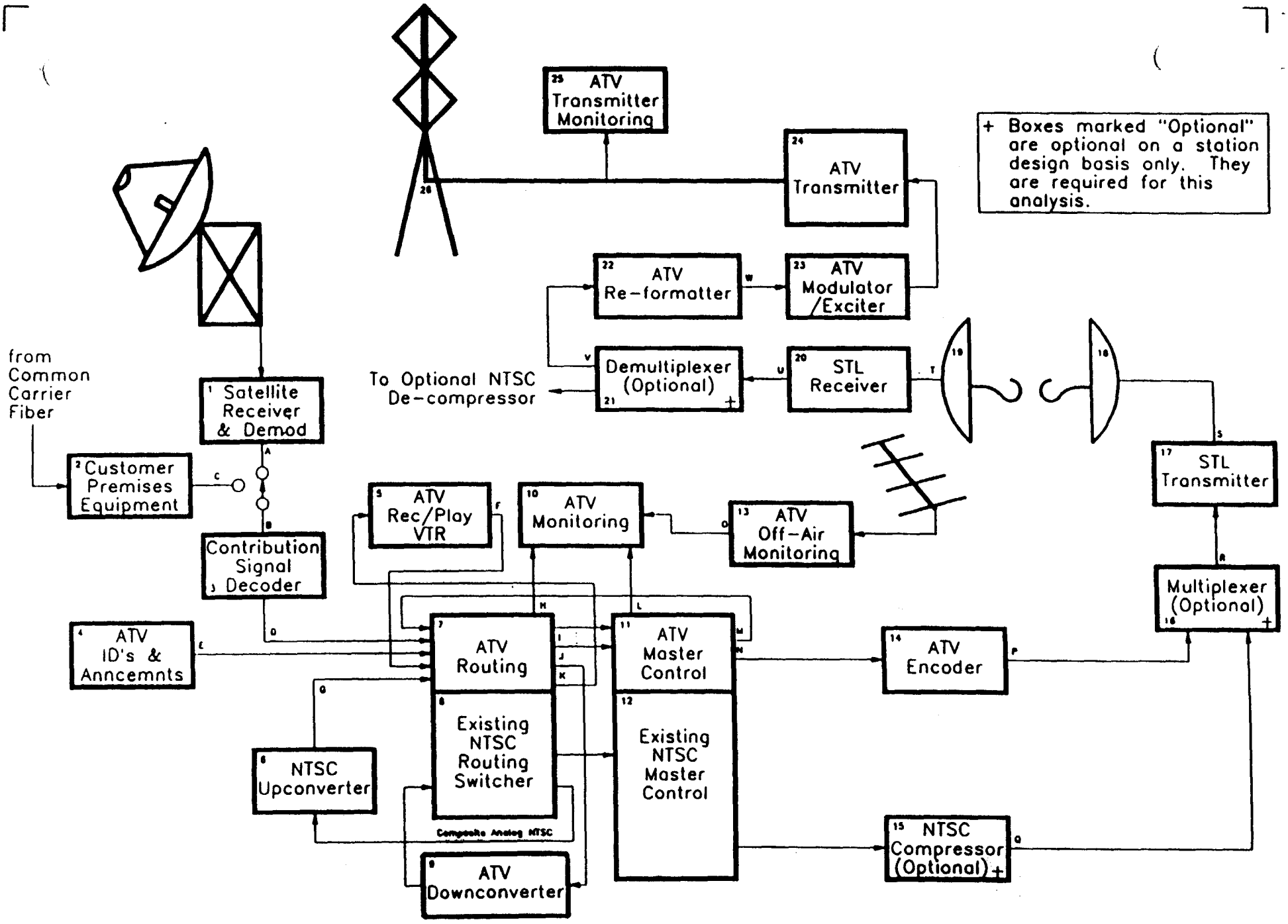
- Other inputs from Proponents
  - Comments on PERT, Gantt charts, Lists of Assumptions
  - Block diagrams of ATV stations
    "Minimal"
    "Transitional"
- Block diagrams jointly developed with SS/WP-3
  - Common descriptive terminology generated
  - Charts provided for filling in descriptions of system elements
- Uses "pass-through" television station as a model
  - Representative of other applications
  - E.g., Cable Headend — commercial insertion

Analysis of System-Specific Implementation - *cont'd.(2)*

- "Minimal" station assumes limitations in program release capability
  - Uses fully compressed signals throughout for minimum cost
  - Requires all transitions to be cuts - full screen material, no effects
  - Cuts may be less than perfect, depending upon system
- "Transitional" station provides upgrade path to full capability program release
  - Signals at higher data rate than full compression
  - Signals may be decoded for processing
  - With signal decoding, can provide effects and continuity transitions
- Review of all materials against current PERT/Gantt/Assumptions
  - Preparation of System-Specific versions, if required
  - Characteristics of interest included in last report
- "Minimal" television station block diagram
- "Transitional" television station block diagram



ATV "Minimal" Television Station



ATV "Transitional" Television Station

Survey of Professional Equipment Manufacturers

- Professional equipment manufacturers surveyed once at beginning of process
  - Survey based solely on different production standards
  - Only information available at the time
  - Apparent that many answers were given to influence the outcome of the process
  - Results of the initial survey were discarded as inconclusive
- Professional equipment manufacturers to be surveyed once again
  - Far more known about the system proprosals
  - Fewer options for underlying raster specifications
  - Opportunities for other forms of compression must be explored
  - IS/WP-2 to concentrate on timing of availability of equipment
  - Will likely work in cooperation with SS/WP-3 handling the economic issues
- Analysis of Proponent responses a prerequisite
  - Will help identify nature of equipment that will be required
  - Will permit differentiation of systems
  - Survey design to be based upon responses

Survey of Consumer Electronics Manufacturers

- Findings by Consumer Electronics experts in IS/WP-2
  - Receivers generally available 2½-3 years following FCC decision (and assumed availability of technical information)
  - Proponent might have 6-9 month advantage in start-up
  - General availability required to begin real consumer market
- Survey of Consumer Electronics Manufacturers undertaken to validate findings
  - Because of significance of receiver availability to entire implementation
  - Participants in IS/WP-2 represent 3 C.E. manufacturers
  - All three are members of proponent teams
- Responses continue to confirm IS/WP-2 findings
  - Survey covers total of 14 manufacturers
  - Ten responses returned so far + 2 participants in IS/WP-2
  - Over 85% of companies are represented
  - All confirm timing of receiver availability as determined by IS/WP-2 experts
  - Some suggestions received for improvements in PERT/Gantt/Assumptions
- Press report quoting manufacturer as indicating 1 year to receiver availability
  - Direct response from manufacturer supports IS/WP-2 analysis

Survey of Consumer Electronics Manufacturers - *cont'd.*

- IS/WP-2 documents modified based on inputs from C.E. manufacturers
  - Single set of PERT/Gantt/Assumptions split into three sets
  - Categorizes manufacturers by types
    - Proponent consumer electronics manufacturer
    - Non-proponent manufacturer that develops its own Integrated Circuits
    - Non-proponent manufacturer that purchases Integrated Circuits from a vendor
  - Differentiation will allow more careful examination of timing of receiver availability
- One (non-manufacturer) proponent indicates shorter time to receiver availability
  - Based on earlier IC availability to manufacturers from vendors
  - Accepts risk of starting IC development before ACATS/FCC selection
  - Difference might be six months from IS/WP-2 analysis
  - Efforts continuing to bring consistency to data

Survey of Software Users and Providers

- Request from IS to determine expected availability of programming
  - Users' expectations of supply
  - Producers'/distributors' expectations of demand
  - Plans for production and distribution
- Decision by IS/WP-2 to conduct informal, mini-survey as start
  - Avoid full, complex, time consuming survey, if possible
  - Identify issues to be included in larger survey, if needed
  - Hope is that there will be consistency of responses
- Informal survey devised, first data taken
  - Dozen questions asked
    - First HDTV programming to be offered
    - Production formats to be used
    - Timing of initial program production/distribution, equipment installations
- 10-20 answers sought
  - Broadcast/cable networks
  - Studios/distributors
  - Production/post production houses

Examination of Distributed Transmission Concept

- Idea discussed informally in industry for some time
  - Introduced formally to ACATS process by MIT submission to SS/WP-1
  - IS/WP-2 decided to look at implications for implementation (5/26/92)
  - Further discussions and plan for examination at last meeting (6/24/92)
- Concept similar to cellular television
  - Multiple transmitters serving smaller areas than single transmitter
  - Lower power, lower height
  - Unlike true cellular systems, all on a single frequency/channel
- Potential solution to two problems
  - Short spacing of co-channel stations
  - Limitations in capacity at main transmitter facility
- Potential operational & technical obstacles to be examined
  - Cost of installation/operation/maintenance of multiple sites *vs.* single
  - Characteristics required in transmission system
  - Characteristics required in receiver
  - Possibility to burden all receivers for sake of a few situations

Examination of Distributed Transmission Concept - *cont'd.*

- Two-step examination devised
  - Develop broadcaster system requirements to make technique practical
    - Small group assigned to develop needs/systems
    - Input to be sought from existing Local Area Groups
  - Seek Proponent input on characteristics of their systems
- If match between requirements and characteristics, arrange further study
  - Local Area Groups for real world evaluation
  - SS/WP-1, SS/WP-2, Field Test Task Force, etc.

Follow-up with Local Area Groups

- Local Area Groups established in five major cities
- Two-fold purpose
  - Gain implementation information for IS/WP-2 from potential problem cities
  - Instigate head start for broadcasters in some of the major markets
- Local Area Groups needed more information to proceed
  - Data on system power levels for coverage equivalent to NTSC
  - System transmitter linearity requirements and headroom capabilities
  - Availability and power handling of wideband antennas
  - Other antenna options
- Most of needed information now available
  - Local Area Groups to be asked to look at their situations again and report
- Decision to add five more cities
  - Coordinated with Broadcaster Caucus — no conflict
  - Cities to be decided by Local Area Group liason
  - Combination of top & mid markets

Responsibilities of Selected Proponent

- Issue arose from original IS/WP-2 identification of documentation requirements
  - Significance of documentation covered in earlier reports
  - Handed off to IS/WP-1 for further examination
  - Came to include more than just the disclosure of the selected system
- Some controversy over language to express undertakings required
  - IS/WP-2 requested to provide wording to spell out details
  - Draft proposal submitted — discussed at IS/WP-1 & IS/WP-2
  - Decided to raise to higher level
- Current understanding
  - Issue covered by original agreement signed by proponents
  - No need for further work by IS/WP-2

Concern for Time Required for Documentation Process

- Documentation of selected system is gating item for entire implementation
  - On the Critical Path in all scenarios
  - Seen as very complex standards writing process
  - Must be kept to minimum in any way possible
  - Assumed in IS/WP-2 studies to be completed at time of NPRM
- Concern expressed regarding perceived opportunity to "improve" selected system
  - Other proponents
  - Non-proponents
  - If allowed to happen, could significantly impact speed of implementation
- IS/WP-2 writing White Paper on the subject
  - Target audience is organization that will conduct documentation process
  - Small group assigned to provide inputs on subject

Final IS/WP-2 Activities

- Integration of PERT/Gantt/Assumptions into single Implementation program
  - Currently done by industry segment
  - Plan is to provide unified structure for overall Implementation
  - Will work out inter-industry interactions
- Differentiation of system implementations, if possible
- Preparation of Report to SS/WP-4
  - Detailed description of document provided by SS/WP-4
    - One page summary (to be included in ACATS Final Report)
    - Approx. 25-page backup detail document as part of Appendix
    - Other documentation as necessary for communication to FCC
- Work on Report to SS/WP-4 already begun
  - Outline prepared of IS/WP-2 Fifth Interim Report
  - Will serve as starting point for preparation of Final Report
  - First draft of Executive Summary written